

CLAIMS:

1. A servo writing apparatus comprising:
 - a first servo write head comprising a first write gap to substantially magnetize magnetic particles of magnetic tape in a first direction; and
 - a second servo write head comprising one or more second write gaps arranged to define a time-based servo pattern magnetized in a second direction on the magnetic tape, wherein the first write gap and the second write gaps define a servo channel corresponding to a servo band on the magnetic tape and wherein the first write gap and the second write gaps are substantially aligned in the servo channel to within less than 10 micrometers.
2. The servo writing apparatus of claim 1, further comprising a shield between the first servo write head and the second servo write head.
3. The servo writing apparatus of claim 1, the time-based servo pattern defined by the one or more second write gaps substantially corresponds to one of an N-shaped pattern, a “/ \”-shaped pattern, a “\ /”-shaped pattern, a “< >”-shaped pattern, a “//// \\\”-shaped pattern, a “\\ \\\”-shaped pattern, and a “<<<< >>>>”-shaped pattern.
4. The servo writing apparatus of claim 1, wherein the first servo write head comprises a plurality of first write gaps and the second servo write head comprises a plurality of second write gaps, and wherein each of the plurality of first write gaps aligns with corresponding second write gaps of the plurality of second write gaps to define a plurality of servo channels.
5. The servo writing apparatus of claim 4, wherein each of the plurality of servo channels corresponds to a servo band and each of the plurality of servo channels is separated by a distance corresponding to at least a width of a data track, wherein the width of each of the data tracks is less than 18 micrometers and the width of each of the servo bands is less than 190 micrometers.

6. The servo writing apparatus of claim 1, wherein the first servo write head comprises a first coil controlled to provide a direct current (DC) magnetic field across the first write gap and the second servo write head comprises a second coil controlled to provide magnetic field pulses across the second write gaps.
7. The servo writing apparatus of claim 1, wherein the first servo write head comprises a first core and the second servo write head comprises a second core, wherein the cores are bonded to each other.
8. The servo writing apparatus of claim 1, wherein the second servo write head comprises a surface thin film that defines the second write gaps.
9. The servo writing apparatus of claim 1, further comprising a mounting structure wherein the first and second servo write heads are mounted in the mounting structure.
10. The servo writing apparatus of claim 8, wherein the mounting structure defines a width and the mounted first and second servo write heads define a separation distance, and wherein a ratio of the mounting structure width to the servo write head separation distance is greater than 2 to 1 and less than 50 to 1.
11. The servo writing apparatus of claim 8, wherein the mounted first and second servo write heads define a separation distance greater than 0.7 millimeters and less than 20 millimeters.

12. A servo writing apparatus comprising a core that defines a first servo write head and a second servo write head, wherein the first servo write head comprises a first write gap to substantially magnetize magnetic particles of magnetic tape in a first direction and the second servo write head comprises one or more second write gaps oriented to define a time-based servo pattern magnetized in a second direction on the magnetic tape, wherein the first write gap and the second write gaps define a servo channel corresponding to a servo band on the magnetic tape and wherein the first write gap and the second write gaps are substantially aligned in the servo channel to within less than 10 micrometers.

13. The servo writing apparatus of claim 12, further comprising a mounting structure, wherein the core is mounted in the mounting structure.

14. A method comprising aligning a first write gap of a first servo write head that substantially magnetizes magnetic particles of magnetic tape in a first direction and one or more second write gaps of a second servo write head that are arranged to define a time-based servo pattern magnetized in a second direction on the magnetic tape, such that the first write gap and the second write gaps define a servo channel corresponding to a servo band on the magnetic tape and the first write gap and the second write gaps are aligned in the servo channel to within less than 10 micrometers.

15. The method of claim 14, wherein aligning the first write gap and the second write gaps comprises aligning the second write gaps to a mount reference surface on a mounting structure and aligning the first write gap to the second write gaps and the mount reference surface.

16. The method of claim 15, further comprising using an alignment tool comprising a servo head holder and a microscope objective to individually align the second write gaps and the first write gap to the mount reference surface.

17. The method of claim 14, further comprising bonding the first servo write head and the second servo write head to each other once the first write gap and the second write gaps are aligned.

18. The method of claim 14, further comprising mounting the first servo write head and the second servo write head in a mounting structure once the first write gap and the second write gaps are aligned.

19. The method of claim 14, wherein the first servo write head and the second servo write head comprise a surface thin film, the method further comprising bonding the first servo write head and the second servo write head to each other and forming the first write gap and the second write gaps in the surface thin film.

20. The method of claim 19, wherein forming the first write gap and the second write gaps includes using a single mask to create the first write gap and the second write gaps.